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The Bean Ladybird and its Control

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ENTOM

THE BEAN CROP of the Southwest suffers severe injury from the bean ladybird, which sometimes ruins entire crops. It is restricted to beans for food and attacks all kinds. Both beetles and their larvæ devour all parts of a plant—leaves, flowers and pods—but the chief injury is to the foliage.

This pest can be controlled in small areas by hand-picking the overwintered beetles and by brushing the larvæ or young from the plants during hot, dry weather. On a larger scale it may be controlled by spraying with arsenite of zinc, arsenate of lead, or arsenate of lime. Clean cultivation should be practiced and early and late planting.

Contribution from the Bureau of Entomology
L. O. HOWARD, Chief
Washington, D. C. November, 1919

THE BEAN LADYBIRD AND ITS CONTROL.

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CONTENTS.

	Page.		Page.
A serious enemy to the bean crop in the Southwest	3	Life history	4
Distribution	4	Natural control	5
Habits	4	Artificial control	5
		Summary of control measures	7

A SERIOUS ENEMY TO THE BEAN CROP IN THE SOUTHWEST.

In the semiarid regions of the Southwest a beetle, known both as the bean ladybird and as the spotted bean beetle, is extremely injurious to beans. It is indeed a serious pest and has been described as being to the bean crop in that region what the Colorado potato

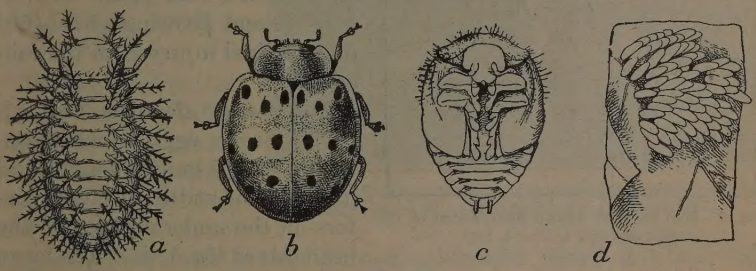

FIG. 1.—The bean ladybird: *a*, Larva; *b*, beetle; *c*, pupa; *d*, egg mass. About four times natural size.

beetle is to the potato in the East. It is not unusual for it to ruin entire crops. Fortunately, its field of operations has not extended materially, and it is limited for food to beans (including soy bean), its only natural food plant as far as known.

This beetle is one of the two native species of the ladybird family occurring in the United States known to live by choice on vegetation,[2] the ladybirds other than these two being predacious and subsisting largely upon aphids or plant-lice and small, soft-bodied larvæ.

The bean ladybird is nearly hemispherical, broadly oval in outline, and measures a little more than a fourth of an inch in length. Its

[1] *Epilachna corrupta* Muls.; family Coccinellidae, order Coleoptera.
[2] The second species is the squash ladybird (*Epilachna borealis* Fab.).

color is dull yellowish brown, and each wing-cover bears eight black spots arranged as shown in figure 1, *b*.

DISTRIBUTION.

The bean ladybird undoubtedly came from Mexico. It was first recognized in the United States in 1864, but nothing appears to have been known concerning its injurious habits for nearly 20 years, when in 1883 it did serious injury to wax beans in Colorado. The species is also now well established in New Mexico and Arizona, and is found, more rarely, in western Texas. It is also said to occur in Kansas and Arkansas, but not as a pest. The distribution as outlined in the map (fig. 2) indicates the probability of its becoming established in the future in near-by counties in Oklahoma, Nebraska, Utah, and Wyoming.

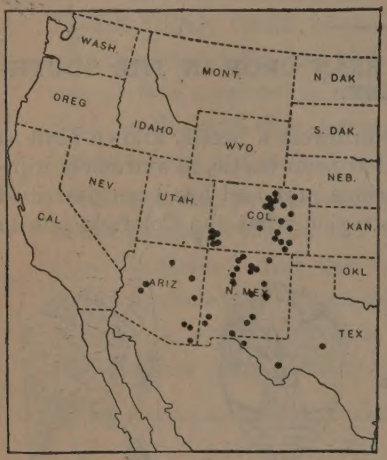

FIG. 2.—Map showing known distribution of the bean ladybird to June 1, 1919.

HABITS.

The bean ladybird in both the larval and adult stages devours all parts of a bean plant—leaves, flowers, and growing pods—but its principal injury is to the foliage.

The female deposits her yellowish brown eggs, which measure about 1.2 mm. in length and half that in width, in large clusters on the under surface of the bean leaves (fig. 1, *d*). The larva (fig. 1, *a*) when full-grown is a little longer than the beetle, is light yellow in color, and its body is covered with long, stout, branched spines, which are dark at the tips. When fully matured, it attaches itself to a leaf or pod by its rear end and transforms to the pupa, or resting stage (fig. 1, *c*).

The beetle makes its first appearance in New Mexico and Colorado early in June, continuing into July, a new generation or "brood" of beetles occurring in September and October. The winter is passed in the adult stage.

The beetles feed chiefly on the upper surface of the leaves, eating over the outer skin, as shown on the title-page (adult above, pupæ in middle, and larva at left, below) and cutting irregular holes in and through them, while the larvæ feeding on the lower surface skeletonize the leaves, seldom cutting through them.

LIFE HISTORY.

The eggs (fig. 1, *d*) are deposited from the first week of June until August on the lower surface of the bean leaves in clusters of half a dozen to 75, or usually of about 40, and sometimes to a total number of 1,500 by a single female. The larvæ feed at first in colonies, but with larger growth scatter about to other beans and become more or less solitary.

The entire life cycle from egg to adult may be passed in midsummer in from 22 to 30 days; the eggs hatch in from 4 to 9 days; the active larval period is between 15 and 21 days; and the pupal, or quiet resting period varies from 3 to 6 days. In cooler weather, however, these periods are longer. The insect winters over as an adult or beetle, and two generations or "broods" are produced annually.

FIG. 3.—Traction sprayer with nozzle arrangement for side spraying, of type useful for spraying beans for the bean ladybird.

NATURAL CONTROL.

The beetle when disturbed has a habit, possessed in common with other ladybirds, of drawing up its legs and exuding a small drop of yellow liquid having a disagreeable odor, which, it is believed, enables it to secure some protection from the attacks of natural enemies.

Cold weather in late autumn has the effect of destroying the insects, and their eggs are also destroyed by three kinds of predacious or beneficial ladybirds.[1]

ARTIFICIAL CONTROL.

In the control of the bean ladybird preventive measures are the most efficient, consisting of hand-picking and brushing from the plants, clean culture, and early and late planting.

Arsenicals possess some killing properties, but act mainly as repellents or preventives of attack.

[1] *Hippodamia convergens* Guér., *H. 5-signata* Kby., and *Coccinella transversoguttata* Fab.

HAND PICKING AND BRUSHING.

The overwintered beetles should be gathered and destroyed as soon as they make their appearance, early in June. If this measure has been neglected, the larvæ should be brushed from the foliage to the earth between the rows, which may be accomplished by striking the plants with the bare hand, with a handful of weeds, or with a paddle fashioned from a shingle. If this is done in dry, hot weather few if any larvæ will be able to return to the plants.

BURNING RUBBISH.

Since the bean ladybird passes the winter under old bean vines and tufts of grass and weeds, the numbers of beetles may be greatly reduced by burning in late fall or early spring all rubbish of this nature, particularly along ditches and fence corners. Every effort should be made to break up these wintering quarters and destroy the insects therein.

EARLY AND LATE PLANTING.

A practice of planting earlier than usual and of planting considerably later than the ordinary planting time has been employed with good results. If this were practiced in a community for a series of years, it is confidently believed that the numbers of the insect would be decreased materially. Late planting should be so timed that the plants will come up after the overwintered beetles have ceased feeding and at the same time early enough to secure a crop before frost.

Definite periods for early or late planting can not be assigned because of the range of this beetle and it is a matter for the growers to determine by actual practice. They may rest assured, however, that once these periods are determined the numbers of the pest in a given community will be greatly decreased.

SPRAYING.

The well-known extreme susceptibility of bean foliage to injury by the slightest trace of free arsenic has led to distrust of spraying as a remedy for the bean ladybird. When the insect first appeared as a pest, Paris green was widely used, with the result that more serious injury was accomplished to the foliage than where no preventive measures were attempted. *Paris green should never be applied to bean foliage.* Arsenate of lead, arsenite of zinc, and calcium arsenate, on the other hand, may be applied to beans (see fig. 3) with comparative safety at rates not to exceed 2 pounds of the powdered insecticide to 50 gallons of water or Bordeaux mixture. A lighter dosage, about 1½ pounds, however, is quite as effective in ordinary

cases of infestation, more economical, and less likely to cause burning. Young larvæ are readily killed by these applications, but older larvæ appear to die of starvation rather than eat poisoned foliage.

The best quality of arsenicals should be used for spraying bean foliage, as there is evidence that reported cases of burning have been due to the use of an inferior quality of these insecticides. In the case of slight burning, the plants usually put out additional foliage and practically no harm is done.

Arsenite of zinc, 1 pound to 1¼ pounds in 50 gallons of water or of Bordeaux mixture, appears to be somewhat more effective, causing less burning of the foliage and killing a larger percentage of the insects. Arsenate of lime may be used at the same strength.

SUMMARY OF CONTROL MEASURES.

The best known methods of controlling the bean ladybird may be summarized as follows:

(1) For small gardens and similar areas, hand pick the overwintered beetles as soon as they emerge from hibernation.

(2) Brush the larvæ or young from the plants during hot, dry weather.

(3) Spray the infested plants with arsenite of zinc or arsenate of lime, at the rate of 1¼ pounds to 50 gallons of water, or with arsenate of lead, 2 pounds (powder) to 50 gallons of water.

(4) Clean up dead grass, weeds, crop remnants, and other hibernating quarters during the fall or early winter months, and destroy them, together with the insects they harbor, by burning.

(5) Practice early and late planting. No special time can be indicated for this in the entire region which the insect inhabits and it is therefore necessary for each grower to work out this problem.

(6) In the case of large areas of beans, close inspection is strongly recommended. Infestation begins in small, localized areas and if these infested spots are located and prompt measures, as indicated in the preceding paragraphs, are taken to destroy the insects a general infestation can be prevented.

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